Yawing Force of Electric Trimmers of a Hybrid Buoyant Aerial Vehicle

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Abstract

All buoyant and hybrid buoyant aerial vehicles have directional stability issues at low speed. Electric trimmers are one of the potential solutions for controlling the yaw motion of such vehicles in which partial lift is obtained from the wings. However, available propeller disk area of such trimmers is limited due to small surface area of the vertical tail. In the present work, maximum input power required by thin electric propellers with different pitch values are compared to obtain an optimised value of pitch for propeller selection. Analytical as well as computational techniques are employed to evaluate the moment generated by tangential thrust produced by a ducted propeller. Motocalc (R) software under predicts the thrust value when compared with the computational results under the same flow conditions. The estimated yaw force produced by the propeller is quite significant and it can also be used for creating differential thrust using twin electric motors.

Keywords

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